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OS0HQ-A

OSCILLOSCOPE

1. GENERAL. This procurement requires a portable, four-channel, 150 MHz general purpose oscilloscope.

2. CLASSIFICATION. Type II, Class 5, Style D, and Color R in accordance with MIL-T-28800 for shipboard applications. A tilt-bail handle is required.

3. OPERATIONAL REQUIREMENTS. The equipment shall be capable of operation within the minimum accuracies, limits, and specifications detailed below.

3.1 Vertical amplifiers. The requirements specified below apply to four identical vertical channels. The capability of inverting the signal polarity of at least one channel shall be provided by manipulation of a front-panel control.

3.1.1 Bandwidth. DC to 150 MHz. AC low frequency roll-off: 10 Hz or less. Digitizing oscilloscopes shall have a minimum sample rate of 100 MSa/s.

3.1.1.1 Bandwidth limiting. A control shall be provided to limit high frequency interference above approximately 20 MHz.

3.1.2 Input coupling. AC, dc, and GND.

3.1.3 Input impedance. Selectable impedances of 1 Megohm parallelled by 25 pf or less and 50 ohms shall be provided.

3.1.4 Deflection factor. Range: 5 mV/div to 5 V/div continuously variable between calibrated steps. An uncalibrated condition indicator is required.

3.1.4.1 Deflection accuracy. ±2% measured with a 4 to 5 division signal centered on screen.

3.1.5 Overload protection. At any vertical range setting, ac or dc coupled, with impedance set to 1 Megohm: 400V (dc + peak ac).

3.1.6 Common mode rejection ratio. 20 dB at 50 MHz.

3.1.7 Display modes. Channel 1, channel 2, channel 3, channel 4, up to four channels simultaneously in any combination. It shall be possible to add channel 1 to channel 2, and channel 3 to channel 4.

3.1.8 X-Y operation. Bandwidth: 2 MHz. Phase difference: 3 degrees maximum at 100 kHz.

3.2 Horizontal deflection.

3.2.1 Sweep modes. Normal, delayed, and intensified (intensified is not required of digitizing oscilloscopes).

3.2.2 Sweep trigger modes. Normal, automatic, and single.

3.2.3 Main time base. Range: 10 ns/div to 500 ms/div continuously variable between calibrated steps. An uncalibrated condition indicator is required. Accuracy: ±2% of setting. Digitizing oscilloscopes are not required to have a continuously variable time base.

3.2.4 Delayed time base. Range: 10 ns/div to 0.5 ms/div continuously variable between calibrated steps. An uncalibrated condition indicator is required. Accuracy: ±2% of setting. Digitizing oscilloscopes are not required to have a continuously variable time base.

3.2.5 Intensification. A control shall be provided to intensify that part of the sweep controlled by the main time base that is to expand to full screen display in the delayed time base mode. (This function is not required of digitizing oscilloscopes.)

3.2.6 Horizontal triggering.

3.2.6.1 Trigger source. Any vertical input channel or external.

3.2.6.2 Trigger sensitivity. Internal sources only (except chop mode): 0.6 division from dc to 100 MHz; 1.2 divisions from 100 to 150 MHz.

3.2.6.3 Trigger coupling. DC, ac, low frequency reject, and high frequency reject.

3.2.7 Sweep expansion. A X10 sweep expansion (horizontal magnifier) control for the main and delayed time bases shall be provided. Accuracy: ±5% of the time base setting. Digitizing oscilloscopes may provide this function through equivalent sweep speeds and sweep delay.

3.2.8 Horizontal position. A horizontal position control shall be provided to move the left end of the trace to the right past the center graticule and the right end of the trace to the left past the center graticule. This specification shall apply in both the X1 and X10 horizontal magnifier position. (This function is not required of digitizing oscilloscopes.)

3.3 Calibrator. Analog oscilloscopes shall have a square wave calibrator signal, provided through a front-panel connector, that is compatible with at least one type of supplied probe tip. The calibrator voltage shall be regulated to within ±1% when loaded by 1 megohm paralleled by 25 pF or less. The calibrator signal shall have a rise time not to exceed 1 us and shall have protection from damage when grounded. Digitizing oscilloscopes shall have a square wave probe compensation signal provided through a front-panel connector, and a dc calibrator with ±1% accuracy provided through either a front or rear panel connector.

3.4 CRT display. A CRT display shall be provided that has a minimum useful scan area ten divisions wide by eight divisions high. A division shall equal at least 0.8 cm.

3.4.1 Graticule. An internal graticule shall be provided. The cardinal axes shall be ruled in 0.2 major division increments.

3.4.2 CRT controls and adjustments. Focus, intensity, astigmatism, and trace rotation for analog oscilloscopes. Intensity only for digitizing oscilloscopes utilizing raster-scan CRTs.

3.4.3 Z-axis input. An input shall be provided to permit intensity modulation of the display within a range of dc to at least 10 MHz.

3.5 Digitizing oscilloscope requirements. If a digitizing oscilloscope is provided for this application, it shall have the features detailed in 3.5.1 thru 3.5.5.

3.5.1 Sample rate. 100 MSa/s, minimum.

3.5.2 Vertical resolution. 8 bits, minimum, at most sensitive vertical scale factor.

3.5.2.1 Effective bits. 6 minimum.

3.5.3 Horizontal record length. 500 points, minimum.

3.5.4 Parametric measurements. The equipment shall be capable of automatically measuring and displaying the following parameters of the displayed signal: period, frequency, width (+ and -), rise time, fall time, peak (+ and -), peak-to-peak, and rms amplitude. Rise and fall times shall be measured between the proximal and distal points, and width shall be measured between the mesial points of pulse waveforms. Pulse parameters shall be as defined in IEEE Standard 194-1977, "Standard Pulse Terms and Definitions."

3.6 Automatic setup. The equipment shall be equipped with a single push-button control that will initiate automatic adjustment of the vertical and horizontal deflection factors and trigger level for an optimized display of the input signals. This function shall operate with signals exceeding 1% duty cycle and frequencies of 50 Hz.

4. GENERAL REQUIREMENTS.

4.1 Power source. MIL-T-28800 nominal power source requirements are invoked. Maximum power consumption: 350W.

4.2 Weight. 20 kg (44 lb) maximum.

4.3 Digital interface. A digital interface is required in accordance with MIL-T-28800.

4.4 Lithium batteries. Per MIL-T-28800, lithium batteries are prohibited without prior authorization. A request for approval for the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposals. Approval shall apply only to the specific model proposed.

4.5 Accessories. Two 10:1 voltage divider probes, two 1:1 voltage probes, and a probe tip kit for each probe. An attached accessory pouch may be used for storage of all supplied accessories in lieu of front cover storage.